

DESIGN SPECIFICATIONSLOW DISTORTION HIGH-RESOLUTION PRINTERI. GENERAL DESCRIPTION

DECLASS REVIEW BY NIMA / DoD

A. This printer is designed to produce contact prints from long lengths of photographic material in film widths as follows:

1. 70mm - 2.754" \pm .002"

~~7-inches - 6.991" \pm .010"~~ ←

8-inches - 7.960" \pm .010"

9 1/2-inches - 9.460" \pm .010"

2. Future requirements to include:

5-inches - 4.960" \pm .010"

6.6-inches - 6.590" \pm .010", and others

Adaption to various film sizes is accomplished by conversion units which can be interchanged by the printer operator. These units, which consists of two pairs of rubber coated (non-fogging) rollers and two edge vacuum chambers, can be changed without any tools. Locating pins and hand knobs are used to align and fasten the units to the printer. The printing light source, supply and takeup spindles, guide rollers, tension devices and film cleaning station will remain in fixed positions. Quick adjustments are provided to accommodate the various film sizes.

Exposure is made by running the print raw stock in contact with a negative (or positive) at a uniform speed under an illuminated slit. Intimate contact is accomplished by passing the print raw stock and negative through a pair of "wringer rollers" and then directly through edge vacuum chambers. The vacuum chambers prevent air re-entering between the films from the edges during exposure. The film runs between a second pair of "wringer rollers" following the exposure slit located at the end of the edge vacuum chambers to prevent air from re-entering between the films from the "down-stream" side

I. GENERAL DESCRIPTION - Continued

- B. The first unit produced will be an engineering experimental model rather than a preproduction type model.

II. EXPECTED PERFORMANCE

STATINTL

- A. Uniformly high definition with capability to make full use of high definition stock such as Type 5654 (similar to [REDACTED] Duplicating Print Stock) Printer to be capable of transferring information from original material having 150 to 200 lines/mm resolution.
- B. Geometric distortion of photographic image attributable to mechanical conditions in the printer shall be less than .03%.
- C. Exposure banding on the print film run through the gate without an original shall not exceed .03 density variation when the film is processed to a gamma of 1.3 to 1.5 (Log E variation = .02 maximum.)

III. DESCRIPTION OF MAIN COMPONENTS

A. Light Source

1. Source shall be a 1000 watt tungsten filament, mogul bipost lamp.
2. A condenser lens system large enough to cover 9 1/2-inch wide film is provided which can be masked down for smaller film widths, provides collimated light at the printing slit.
3. Provision for mounting a diffusion sheet between the condenser lens assembly and the exposure slit is provided. Embossed plastic diffuser and W-series Plexiglass up to 1/8-inch thickness will be here. The purpose of this diffusion is to reduce high spacial frequency image transfer in printing from grainy and otherwise unsharp original materials.

DESIGN SPECIFICATIONS
LOW DISTORTION HIGH-RESOLUTION PRINTER

- 3 -

July 10, 1961

III. DESCRIPTION OF MAIN COMPONENTS - Continued

STATINTL

- A. 4. Print exposure control is accomplished by measurement of lamp intensity with a [REDACTED] Photographic Color Analyzer and manual adjustment of the lamp intensity before the start of a print run. The required intensity setting is established by pre-reading the negatives on a densitometer.
5. The exposure slit will be an interchangeable mask unit providing slit width up to .800". Slit width will be selected to provide exposure times equal to the time for a whole number of cycles in the electrical power supply. This precaution will reduce or eliminate exposure banding due to cyclic variations of lamp intensity and the synchronous drive motor speed.

B. Printing Gate

1. The gates are designed as interchangeable conversion units for various film widths as required. The engineering model will make provisions for 70mm, 7-inch, 8-inch and 9 1/2-inch wide film only.
2. A .10" wide space at each edge of the original is left unexposed in the print.
3. The edge vacuum chambers will allow splices to pass and accommodate after minor adjustments the following film thicknesses:
 - a) Original Material
 - Thin base Estar support (.003" thick)
 - Standard base Estar support (.0043" thick)
 - Standard base acetate support (.0055" thick)
 - Heavy base Estar support (.0075" thick)

DESIGN SPECIFICATIONS
LOW DISTORTION HIGH-RESOLUTION PRINTER

July 10, 1961

III. DESCRIPTION OF MAIN COMPONENTS - Continued

B. 3. b) Print Raw Stock

Standard base Estar support (.0045" thick)

Standard base acetate support (.0055" thick)

Heavy base Estar support (.0075" thick)

4. No tools are required for changing unit from one film size to another.

C. Print Raw Stock and Negative Film Transport

1. A fixed centerline for all film sizes.

2. The film drive is designed so that both negative and print raw stock are driven at a synchronous speed of 39.3 ft./min., 59 ft./min and 78.6 ft./min. by a Multiple-Speed Hysteresis Synchronous Motor. The drive rollers are coupled to a worm gear box with ceramic magnetic couplings for easy interchangeability.

3. The supply and takeup spools for both original and print raw stock are "MIL Standard" flanged spools with flange diameters from 5 3/8-inches (200 ft.) to 7 5/8-inches (500 ft.) and core diameter of 2 1/8-inches.

4. The film windup spindles are designed to have adjustable tension with a maximum of 5 lbs. and a minimum of 1/2 lb. These figures maybe modified following performance tests.

5. Film tension at each of the takeup and supply sections is controlled by a spring loaded looping roller whose position (length of the loop) controls the torque applied to the particular film spindle. Movement of the looping rollers will operate a potentiometer which will alter the film tension within the torque capacity of the hysteresis clutch (takeup) and brake (supply).

III. DESCRIPTION OF MAIN COMPONENTS - Continued

- C. 6. The tension device consists of a flanged roller mounted on a self-aligning bearing and ball bushing. This allows the roller to move angularly and laterally. Consequently it has no influence on the position and direction of the film. The guide rollers on the supply side and the drive and pressure roller combination determine the direction and position of the film.
7. Attention will be given to making the film path scratch free.
- D. Interlocks - Film Drive Prevention
1. Switches on the drive pressure roller carriage and each vacuum chamber cover to assure they are in position before a print run is begun.
 2. Excessive loop switches for the takeup tension arms only.
 3. Loss of loop switches on each tension arm.
 4. Compartment door switch.
- E. Cleaning Station
1. Located near the entrance to the film gate.
 2. Consists of four 10-inch static eliminators (Inductors) and two pairs of rotating brushes.
 3. One power supply is used to operate the four inductors and one motor to operate the two sets of brushes.
 4. The complete unit is connected to a centrifugal blower intake to exhaust dust and dirt particles removed by the brushes.
- F. Control Panel
1. Main Switch - 3-position (locking in all 3-positions)
 - a) 1st Position - Off
 - b) 2nd Position - Standby

STATINTL

████████ Analyzer energized (Must remain on continuously for stability reasons)

DESIGN SPECIFICATIONS
LOW DISTORTION HIGH-RESOLUTION PRINTER

- 6 -

July 10, 1961

III. DESCRIPTION OF MAIN COMPONENTS - Continued

F. 1. c) 3rd Position - On

STATINTL

██████████ Analyzer remains on.

Takeup hysteresis clutch and motor energized.

Supply hysteresis brake energized..

Lamp blower energized.

Supplies energy to Operate Switch, Lamp Test Switch and
Vacuum Pump Switch.

2. Operate Switch - 3-position (non-locking in the "Jog" and "On" positions)

a) 1st Position - Jog

Energizes film drive motor only.

b) 2nd Position (Middle) - Off

c) 3rd Position - On

Main blower

Cleaning station blower

Power supply (Static Eliminator)

Rotating brush motor (cleaning station)

Film drive motor

Vacuum pump

Lamp

3. Lamp Test Switch - 2 position (On-Off)

4. Vacuum Pump Test Switch - 2 position (On-Off)

5. Jewel light - Lamp blow-out indicator

DESIGN SPECIFICATIONS
LOW DISTORTION HIGH-RESOLUTION PRINTER

- 7 -

July 10, 1961

IV. OPERATION

A. Sequence of operation

1. Release pressure roller carriage.
2. Open edge vacuum chamber covers.
3. Turn Main Switch to "On".
4. Turn lamp test switch to "On" (Set lamp intensity as required with the variac).
5. Turn lamp test switch to "Off".
6. Place the "original" film on the left hand supply spindle.
(Release spindle detent and set for film size. Swing outboard support out of detent and set for film size.)
7. Pull the leader off the supply spool and thread as follows:
 - a) Over and around the supply self-aligning flanged roller
 - b) Under and around the flanged guide roller
 - c) Through the cleaning station
 - d) Through the film gate drive and pressure rollers
 - e) Over and around an unflanged roller
 - f) Over and around the self-aligning flanged roller
 - g) Attach leader to the takeup spool
8. Repeat steps 6 and 7 for the print raw stock
9. Close edge vacuum chambers covers
10. Replace pressure rollers
11. Jog, operate switch to stabilize the tension arms
12. Close compartment doors
13. Turn operate switch to "On"
14. Printer stops automatically when either the print stock or raw stock is depleted.

DESIGN SPECIFICATIONS
LOW DISTORTION HIGH-RESOLUTION PRINTER

- 8 -

July 10, 1961

V. GENERAL CONSTRUCTION

A. Cabinet

1. The printer is approximately 70-inches high, 40-inches wide and 32-inches deep.
2. Compartment doors are designed to expose the front, sides and top when opened.
3. Fixed panels are all easily removable with quick lock fasteners.
4. The control panel is located in front below the compartment doors convenient to an operator. STATINTL
5. The light intensity control (████████████████████ Analyzer) and variac are located inside the film compartment. The Analyzer meter is enclosed to prevent fogging the print stock when the meter face is illuminated during lamp intensity setting. The enclosure will have a port through which the meter can be seen without fogging the raw stock.
6. The lower portion of the cabinet will house the vacuum pump and blowers. The pump and blowers are resiliently mounted.
7. Filtered air is used to pressurize the film compartment. The exhaust from the cleaning station blower and vacuum pump is directed to a common air chamber for removal from the cabinet.

B. All major components are designed into sub-assembly units for ease of repair and replacement.

C. Leveling screws are used to support the printer firmly on irregular floors.

VI. MAINTENANCE

- A. All areas of the printer are easily accessible for maintenance.
- B. Provisions are made for readily raising unit with a fork lift truck.
- C. Designed for minimum lubrication.

DESIGN SPECIFICATIONS
LOW DISTORTION HIGH-RESOLUTION PRINTER

- 9 -

July 10, 1961

VII. ELECTRICAL

- A. Printer to operate from supply lines of 117 volt \pm 10%, 60 cycle, single phase.
- B. The printing lamp power is supplied through a saturated reactor voltage regulator.

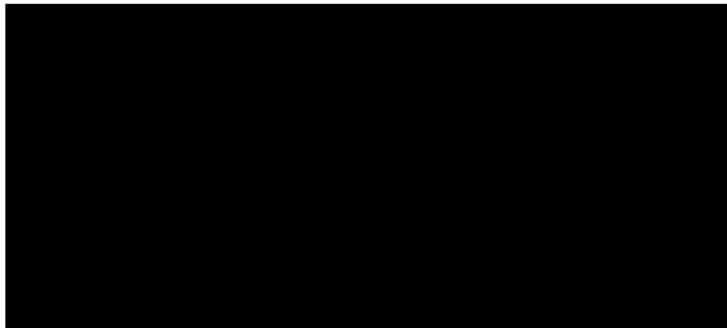
VIII. APPEARANCE

- A. No special appearance consideration is made for the first unit.
- B. A&O #78, fine textured gray enamel paint finish.

IX. SPECIAL FEATURE

- A. The printer can be designed to handle print stock 1/4-inch wider than the original negative to provide a clear border on the Master Positive for titles to be "typed" on if the following steps are taken:
 - 1. Special film gate conversion units.
 - 2. Additional grooves cut into the guide rollers for flange adjustments.
 - 3. Additional stops cut into the supply and takeup spindle and support assemblies.
 - 4. Special masks.
- B. The first unit is designed to accommodate only the film sizes without additional borders mentioned in Section III - B - 1.

STATINTL



Photoprint Engineering